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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/829,010	04/21/2004	Wen-Hsi Lee	9751.105US11	5986

23552 7590 04/10/2006

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EXAMINER	
MAYES, MELVIN C	

ART UNIT	PAPER NUMBER
1734	

DATE MAILED: 04/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/829,010	LEE ET AL.	
	Examiner	Art Unit	
	Melvin Curtis Mayes	1734	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 February 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-9,11-22 and 24-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9,11-16,22 and 24-29* is/are rejected.

7)☒ Claim(s) *17-21* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

(1)

The indicated allowability of claim 23, now Claim 1, is withdrawn in view of the newly discovered reference(s) to Sakai 6,488,795. Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 112

(2)

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

(3)

Claim 25-27 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for bonding glass in the constraining layer and/or dielectric layer OR bonding glass layer between the constraining layer and dielectric layer, does not reasonably provide enablement for bonding glass applied between constraining layer and dielectric body AND bonding lass in at least one of the dielectric layers and constraining layer. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims.

According to the specification either bonding glass is in at least one of the constraining layer or dielectric layer or bonding glass is between the layers. There is no support for bonding

glass being both between the layers and in at least one of the layers as claimed in Claims 25-27 which depend from Claim 1.

Claim Rejections - 35 USC § 103

(4)

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

(5)

Claims 1-9, 11-16, 22 and 24-29 rejected under 35 U.S.C. 103(a) as being unpatentable over Knickerbocker et al. 6,607,620 in view of Sakai 6,488,795 and Flaitz et al. 5,130,067.

Knickerbocker et al. disclose a method of processing greensheets to make a ceramic substrate comprising: providing a laminate (monolithic structure) by providing greensheets 20 having active areas 28 screened and patterned by applying conductive paste into vias and onto the surface to form conductive lines and vias after sintering (active area comprising heterogeneous material pattern of heterogeneous material component), and stacking at least two of the greensheets (dielectric layers and cover layers) with frames 24 such that frames are on the top of the laminate and between greensheets (alternating) to constrain movement including shrinkage of the greensheet within the frame area during stacking and laminating (constraining layer), the frame having openings (windows) of any desired size wherein the edge of an active area of each greensheet is within an opening of the frame; sintering the laminate; and cutting away the frame along cut lines 36 after sintering to produce a plurality of products, the cut lines located between the frame members of the frames and the active areas, the cutting by saw blades

or laser cutting. Frames can also be provided to the opposite surfaces of the greensheets. The frames comprise material such as metal such as nickel for glass-ceramic greensheets (low-temperature co-fired ceramics) and may be laminated or adhered to the individual green sheets by an adhesive layer. For a greensheet thickness of 0.006 inches and frame thickness of 0.005 inches, when a laminate is made of two greensheets is made, the ratio of the total thickness of the greensheets (dielectric body) to the thickness of a frame on the greensheets is 2.4, less than 3.5 (col. 1-5). Knickerbocker et al. disclose using an adhesive layer to adhered a frame to each green sheets but do not disclose an adhesive layer of bonding glass and do not disclose reducing shrinkage during sintering of the glass-ceramic greensheets by applying Z-direction pressure during firing.

Sakai teach that metal foils laminated to green sheets suppress shrinkage of the green sheets during firing and teach that glass paste may be coated between the metal foils and green sheets to provide a bond (col. 6, lines 22-25).

Flaitz et al. teach that X-Y shrinkage is controlled and X-Y distortion and Z-direction camber are eliminated during co-sintering ceramic/metal multilayered ceramic substrate by applying Z-direction force during sintering (col. 4, lines 44-68).

It would have been obvious to one of ordinary skill in the art to have modified the method of Knickerbocker et al. for making a multilayer ceramic substrate by adhering frames of metal such as nickel to the glass ceramic greensheets using an adhesive layer of glass paste (bonding glass), as taught by Sakai, as used to provide a bond between metal foil and greensheet. The use of glass paste to provide bonding glass between each nickel frame and greensheet would have been obvious to one of ordinary skill in the art, as suggested by Sakai. Further, by providing

nickel frames for glass ceramic greensheets and removing the frames after sintering the greensheets, the frames would act to suppress shrinkage of the greensheets during sintering, as suggested by Sakai.

It would have been obvious to one of ordinary skill in the art to have further modified the method of Knickerbocker et al. for making a multilayer ceramic substrate by applying Z-direction force to the glass-ceramic laminate of greensheets and frames during sintering, as taught by Flaitz et al., to control X-Y shrinkage and eliminate X-Y distortion and Z-direction camber. By providing Z-direction force during sintering to control shrinkage, a low-temperature co-fired ceramic having reduced shrinkage is obviously formed.

Allowable Subject Matter

(6)

Claims 17-21 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

(7)

Applicant's arguments filed February 3, 2006 have been fully considered but they are not persuasive.

Applicant argues that in Knickerbocker et al., the frames are removed before the laminated greensheets are sintered and that among the material for the frame are materials which

would not survive sintering temperature and therefore would not prevent shrinkage during sintering. Applicant argues that Flaitz et al. do not teach a process that controls shrinkage during firing that includes bonding glass between the contact sheet and ceramic layer.

(8)

Knickerbocker et al. disclose that the alternatively, the frame may be cut away after sintering of the laminate (col. 4, lines 49-50). Thus the reference not only discloses that the frames can be cut away after sintering the greensheets but also suggests, by cutting away after sintering, to provide frames which withstand the sintering of the greensheets. Nickel frames for glass ceramic greensheets, as disclosed, would withstand sintering for removal after sintering.

Applicant's claimed invention does not require that the "constraining layer" is to prevent shrinkage during firing. The frames of Knickerbocker et al. constrain shrinkage of the greensheets during punching, screening, drying, stacking and laminating and thus can be considered constraining layers. Further, as suggested by Sakai, metal foil on greensheets suppress shrinkage of the greensheets during sintering, and the nickel frames on the glass-ceramic greensheets in the method of Knickerbocker would suppress some shrinkage of the greensheets during sintering.

With respect to Flaitz, as set forth in the rejection, there is suggestion to use glass paste to bond nickel frames to the greensheets in the method of Knickerbocker et al.. Flaitz is pertinent to applying Z-direction force during sintering to control shrinkage.

Conclusion

(9)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melvin Curtis Mayes whose telephone number is 571-272-1234. The examiner can normally be reached on Mon-Fri 7:30 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chris Fiorilla can be reached on 571-272-1187. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Melvin Curtis Mayes
Primary Examiner
Art Unit 1734

MCM
April 5, 2006